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THICKNESS OF BITUMINOUS-COAL AND LIGNITE SEAMS MINED IN THE UNITED STATES IN 1945

BY

W. H. YOUNG AND R. L. ANDERSON

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THICKNESS OF BITUMINOUS-COAL AND LIGNITE SEAMS MINED IN THE UNITED STATES IN 1945[1]

By W. H. Young[2] and R. L. Anderson[3]

Physical conditions, such as thickness and character of the coal seam, dip or pitch of the seam, depth of cover, character of roof and overlying strata, mine water, etc., affect the productivity in bituminous-coal mining. Thickness of the coal seam being mined is probably the most important single item that determines whether the output per man per day shall be low or high; however, in strip mining the depth of cover or overburden to be moved is of equal importance.

Bituminous coal is mined today from seams of exceedingly variable thickness - less than 2 feet to more than 50 feet; however, a large majority of the mines are producing coal from seams 3 to 6 feet thick. The average thickness of the coal seams mined in the United States has not changed materially in the past 25 years. The average seam thickness for all bituminous-coal mines was 63 inches in 1920[4] and 65 inches in 1945. As thick seams have been exhausted in the older fields, other thick seams have been opened in the newer fields.

Productivity increased from 4 net tons per man per day in 1920 to 5.78 in 1945. This 45 percent increase in productivity resulted from increased mechanization. The percentage of underground production represented by coal cut by machines increased from 61 in 1920 to 91 in 1945. Mechanical loading increased from less than 1 percent of underground production in 1920 to 56 percent in 1945, and strip mining increased from less than 2 percent to 19 percent of the total production during the same period.

The 1945 data included in the following tables were compiled from annual reports of production and mine operation, calendar year 1945, submitted by bituminous-coal and lignite producers to the Bureau of Mines. Estimates were made for seam thicknesses not specified by the producer. Data for 1920 were compiled from the Report of the United States Coal Commission, part 3, table II, facing page 1890.

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[1] The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Information Circular 7442."

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[4] W. P. A., Mechanization, Employment, and Output per Man in Bituminous-coal Mining: National Research Project, vol. I, p. 62.

A survey of bituminous-coal mines for 1920 showed that 25 percent of the total United States production came from seams less than 4 feet thick, 45 percent from seams 4 to 6 feet thick, 25 percent from seams 6 to 8 feet thick, and 5 percent from seams thicker than 8 feet. A similar survey for 1945 showed 31 percent of output from seams under 4 feet thick, 37 percent from seams 4 to 6 feet thick, 23 percent from seams 6 to 8 feet thick, and 9 percent from seams over 8 feet thick. Table 1 shows the number and production of bituminous-coal and lignite mines classified by 1-foot intervals of seam thickness mined in 1920 and 1945.

The coal seam of moderate thickness presents the least mining difficulties. Any decided thinning limits production, decreased recovery, and therefore increases cost. Thickening of the seam in underground mining has the same effect; for, as the seam increases in thickness, it becomes necessary to maintain larger pillars, timbering becomes more difficult and finally impracticable, and roof control is almost impossible. The limited information available indicates that for maximum recovery in underground bituminous-coal mines the ideal seam thickness lies between 6 and 8 feet.5/

In 1945 more than one-third of the underground production of bituminous coal in four States was produced from seams 6 to 8 feet thick (ignoring South Dakota, with very small production). Productivity in these four States was as follows: Illinois, 7.85; Indiana, 7.79; Montana, 7.04; and Wyoming, 6.5 net tons per man per day. (See tables 2 and 4.) Two other States, North Dakota and Utah, registered more than 6 net tons per man per day, and both of these States had large percentages of output in the group "8 feet and over."

As previously mentioned, the depth of cover or overburden to be moved is equally as important as the thickness of the coal in strip mining; therefore, there is no relation between productivity and average thickness of coal mined.

Figure 1 shows the percentage of bituminous coal produced, by thickness of seams mined, in the ten largest coal-producing States and total United States in 1945. The States are arranged in order of the percentage of output mined from seams less than 4 feet thick. Figure 2 shows the percentage of bituminous coal and lignite produced, by thickness of seam mined, in each State at strip mines in 1945, and figure 3 shows similar data for underground mines.

Coal near the surface in relatively thin seams that are not suited to underground mining frequently can be recovered by stripping. In some areas, coal seams that could not be deep-mined profitably are being stripped successfully. In 1945 strip mining was carried on in 12 States in coal seams having an average thickness less than that in the deep mines in the same States. These 12 States produced 76 percent of the total strip output in 1945.

5/ Report of United States Coal Commission, part 2, 1922, pp. 655-56.

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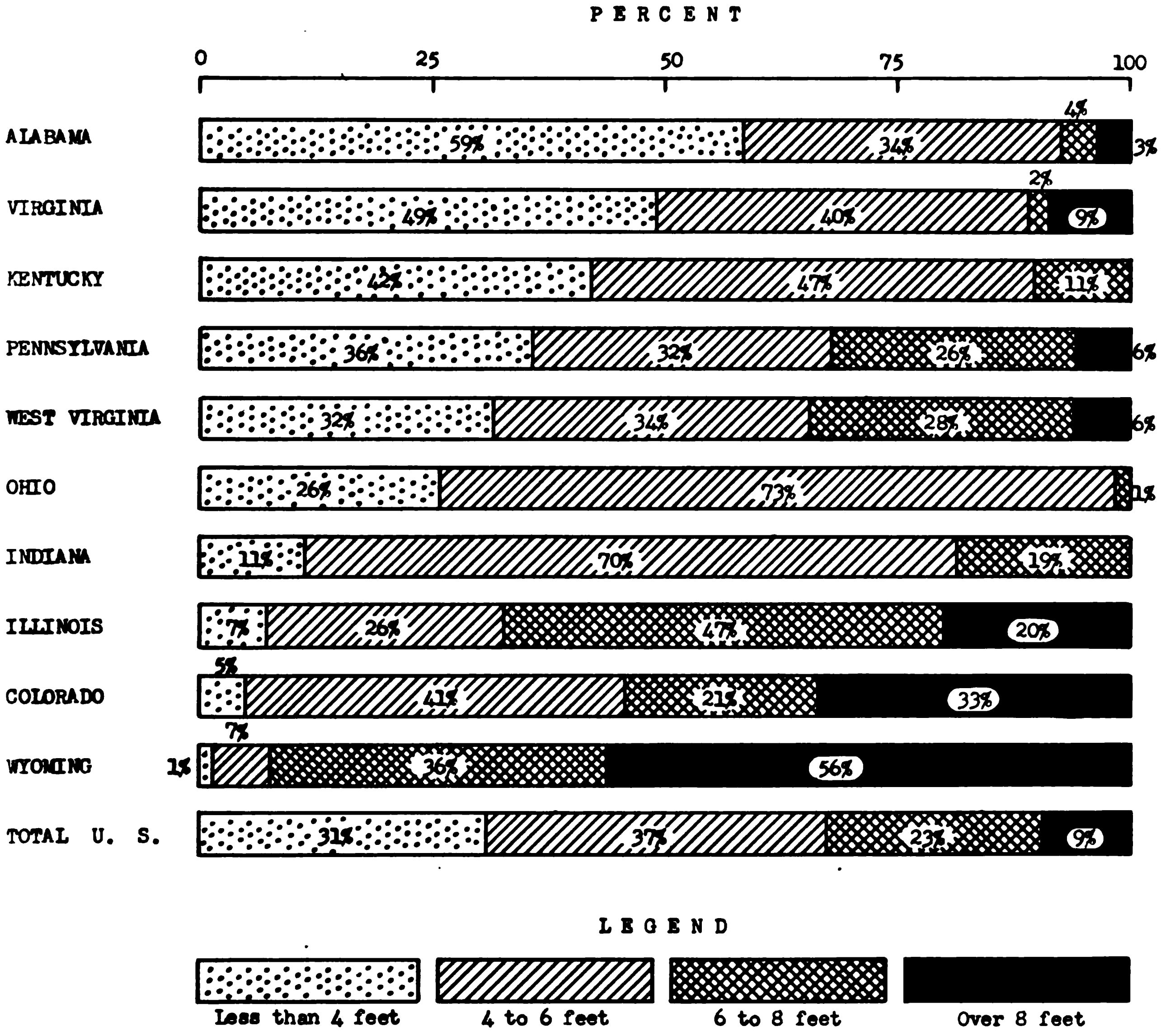

Figure 1. - Percentage of bituminous coal and lignite produced in the ten largest coal-producing States and total United States, by thickness of seams mined in 1945.

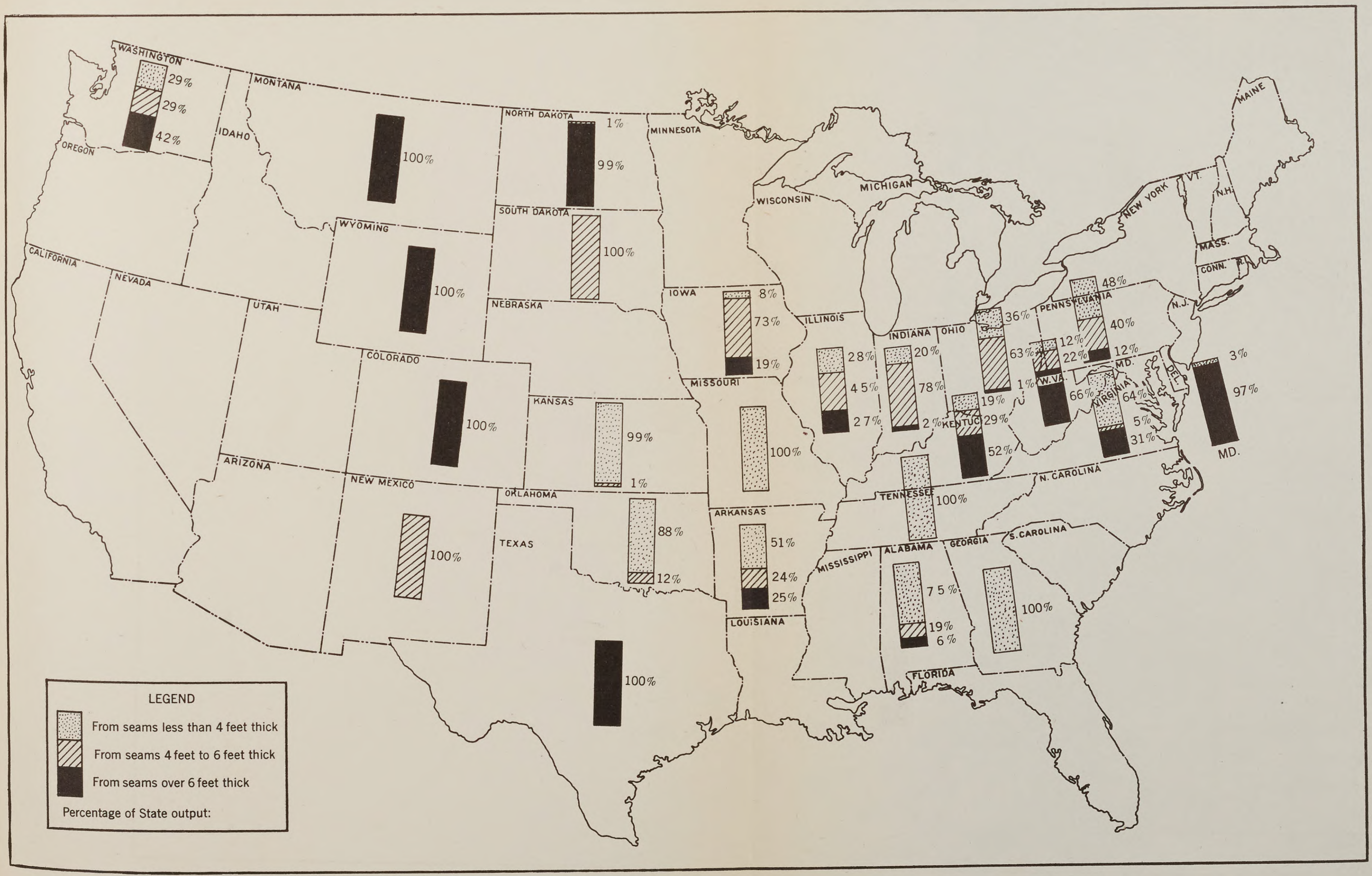

Figure 2. - Percentage of bituminous coal and lignite produced by thickness of seams mined in each State at STRIP mines in 1945.

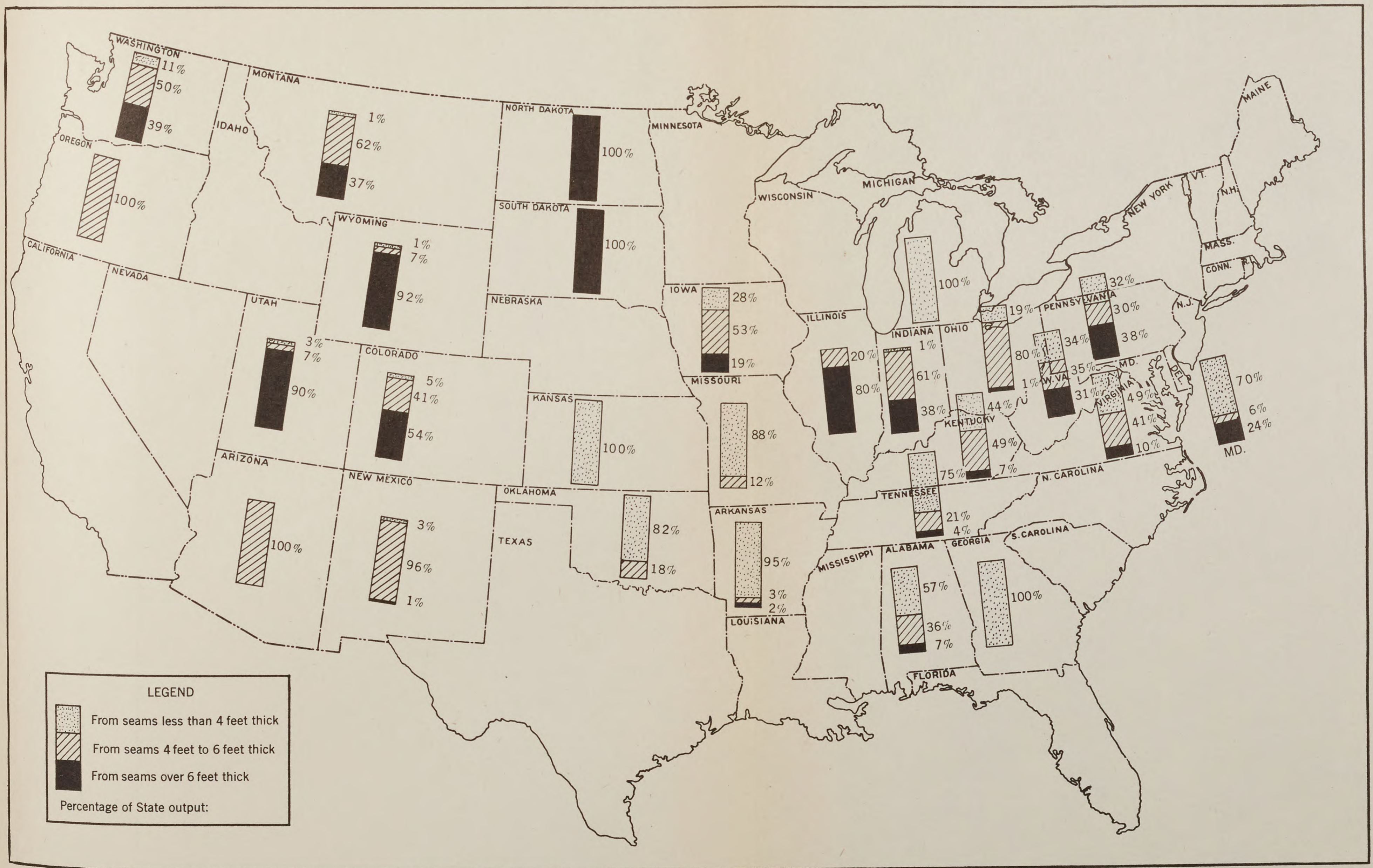

Figure 3. – Percentage of bituminous coal and lignite produced by thickness of seams mined in each State at UNDERGROUND mines in 1945.

TABLE 1. - NUMBER AND PRODUCTION OF BITUMINOUS COAL AND LIGNITE MINES IN THE UNITED STATES, CLASSIFIED BY THICKNESS OF SEAMS MINED IN 1920 AND 1945

(Exclusive of mines producing less than 1,000 tons)

Thickness of seams mined	1920				1945			
	Mines		Production		Mines		Production	
	Number	Percent	Thousands of net tons	Percent	Number	Percent	Thousands of net tons	Percent
Less than 2 feet	139	1.6	2,481	0.4	126	1.8	6,869	1.2
2 to 3 feet	1,159	13.0	31,353	5.6	936	13.3	32,984	5.7
3 to 4 feet	2,240	25.2	104,356	18.5	2,250	32.0	138,781	24.0
4 to 5 feet	1,792	20.1	126,372	22.4	1,710	24.3	136,348	23.6
5 to 6 feet	1,222	13.7	125,589	22.3	838	11.9	75,132	13.0
6 to 7 feet	559	6.3	76,255	13.5	587	8.4	83,738	14.5
7 to 8 feet	393	4.4	63,333	11.2	260	3.7	51,212	8.9
8 feet and over	242	2.7	27,852	5.0	326	4.6	52,553	9.1
Unspecified	1,161	13.0	6,165	1.1	—	—	—	—
Total	8,907	100.0	563,756	100.0	7,033	100.0	577,617	100.0

TABLE 2. - NUMBER OF MINES, PRODUCTION, OUTPUT PER MAN PER DAY, AND AVERAGE THICKNESS OF SEAMS MINED, AT STRIP AND UNDERGROUND BITUMINOUS COAL AND LIGNITE MINES IN THE UNITED STATES, BY STATES, IN 1945

(Exclusive of mines producing less than 1,000 tons)

State	Strip mines				Underground mines				Total all mines			
	Number of mines	Production (net tons)	Average tons per man per day	Average thickness coal mined (feet)	Number of mines	Production (net tons)	Average tons per man per day	Average thickness coal mined (feet)	Number of mines	Production (net tons)	Average tons per man per day	Average thickness coal mined (feet)
Alabama	53	1,890,819	8.29	3.7	324	16,345,720	3.01	4.0	377	18,236,539	3.22	3.9
Alaska	—	—	—	—	5	297,644	2.95	10.6	5	297,644	2.95	10.6
Arizona	—	—	—	—	1	3,853	1.80	5.5	1	3,853	1.80	5.5
Arkansas	23	671,824	8.37	3.9	44	1,182,102	2.72	2.7	67	1,853,926	3.60	3.1
Colorado	5	52,811	7.51	14.8	161	7,568,201	4.52	7.2	166	7,621,012	4.53	7.3
Georgia	1	10,221	5.84	1.5	2	32,347	1.54	1.6	3	42,568	1.87	1.6
Illinois	43	16,909,100	18.52	4.9	270	56,102,092	7.85	7.2	313	73,011,192	9.06	6.7
Indiana	61	13,464,089	15.89	4.4	73	11,718,522	7.79	5.7	134	25,182,611	10.71	5.0
Iowa	23	521,058	8.28	4.9	94	1,524,542	3.39	4.7	117	2,045,600	3.99	4.7
Kansas	29	2,955,500	13.01	1.6	22	273,059	1.86	2.7	51	3,228,559	8.63	1.7
Kentucky	48	6,694,839	19.00	5.8	1,393	62,898,097	4.84	4.2	1,441	69,592,936	5.22	4.4
Maryland	10	217,526	8.49	11.0	84	1,545,177	3.68	4.7	94	1,762,703	3.95	5.4
Michigan	—	—	—	—	3	125,704	2.71	3.2	3	125,704	2.71	3.2
Missouri	36	3,492,302	14.74	2.6	50	490,422	2.32	3.0	86	3,982,724	8.88	2.7
Montana (bit. and lig.)	2	2,556,341	78.92	25.0	31	1,910,447	7.04	5.8	33	4,466,788	14.70	16.8
New Mexico	1	1,480	2.24	5.5	25	1,482,206	4.19	5.3	26	1,483,686	4.19	5.3
North Dakota (lignite)	30	1,859,674	19.06	10.3	23	662,645	8.99	13.7	53	2,522,319	14.73	11.2
Ohio	172	13,483,789	16.08	4.1	363	19,253,646	5.25	4.5	535	32,737,435	7.27	4.3
Oklahoma	18	1,628,418	12.51	2.2	58	1,280,558	3.46	3.6	76	2,908,976	5.82	2.8
Oregon	—	—	—	—	1	16,500	2.32	4.5	1	16,500	2.32	4.5
Pennsylvania	598	27,707,670	14.10	4.2	1,359	105,257,673	4.64	5.2	1,957	132,965,343	5.39	5.0
South Dakota (lignite)	2	21,412	6.61	4.7	2	3,033	4.74	7.5	4	24,445	6.30	5.0
Tennessee	8	206,463	9.65	2.8	132	6,064,245	3.95	3.7	140	6,270,708	4.03	3.7
Texas (lignite)	1	79,949	19.52	12.0	—	—	—	—	1	79,949	19.52	12.0
Utah	—	—	—	—	52	6,679,063	6.18	11.8	52	6,679,063	6.18	11.8
Virginia	8	308,890	14.15	5.0	137	16,926,103	4.18	4.6	145	17,234,993	4.23	4.6
Washington	6	151,811	7.35	8.8	40	1,205,433	3.39	5.8	46	1,357,244	3.61	6.1
West Virginia	186	14,246,255	15.18	6.5	872	137,788,477	5.23	5.1	1,058	152,034,732	5.57	5.2
Wyoming	6	854,624	15.48	23.1	42	8,992,951	6.50	11.8	48	9,847,575	6.84	12.8
Total	1,370	109,986,865	15.46	5.3	5,663	467,630,462	5.04	5.4	7,033	577,617,327	5.78	5.4

TABLE 3. - NUMBER OF MINES, PRODUCTION, OUTPUT PER MAN PER DAY, AND AVERAGE THICKNESS OF SEAMS MINED, AT STRIP AND UNDERGROUND BITUMINOUS COAL AND LIGNITE MINES IN THE UNITED STATES, BY DISTRICTS, IN 1945

(Districts as defined in the Bituminous Coal Act of 1937 and modifications thereto.
Exclusive of mines producing less than 1,000 tons)

District	Strip mines				Underground mines				Total all mines			
	Number of mines	Production (net tons)	Average tons per man per day	Average thickness coal mined (feet)	Number of mines	Production (net tons)	Average tons per man per day	Average thickness coal mined (feet)	Number of mines	Production (net tons)	Average tons per man per day	Average thickness coal mined (feet)
1. Eastern Pennsylvania	336	13,630,115	12.23	3.7	950	43,116,287	4.19	3.8	1,286	56,746,402	4.97	3.8
2. Western Pennsylvania	277	14,697,667	16.22	4.9	513	64,370,317	4.96	6.2	790	79,067,984	5.69	6.0
3. Northern West Virginia	130	10,810,908	15.67	6.9	281	34,155,311	6.23	6.5	411	44,966,219	7.29	6.6
4. Ohio	172	13,483,789	16.08	4.1	363	19,253,646	5.25	4.5	535	32,737,435	7.27	4.3
5. Michigan	—	—	—	—	3	125,704	2.71	3.2	3	125,704	2.71	3.2
6. Panhandle	13	949,818	17.36	4.5	25	3,659,221	5.00	4.7	38	4,609,039	5.86	4.7
7. Southern Numbered 1	32	1,706,468	12.44	4.2	261	54,300,063	4.44	4.6	293	56,006,531	4.53	4.6
8. Southern Numbered 2	35	1,691,068	12.37	4.5	1,547	115,057,670	4.83	4.3	1,582	116,748,738	4.88	4.3
9. West Kentucky	33	5,807,711	20.88	5.9	335	14,636,661	6.94	5.1	368	20,444,372	8.56	5.4
10. Illinois	43	16,909,100	18.52	4.9	270	56,102,092	7.85	7.2	313	73,011,192	9.06	6.7
11. Indiana	61	13,464,089	15.89	4.4	73	11,718,522	7.79	5.7	134	25,182,611	10.71	5.0
12. Iowa	23	521,058	8.28	4.9	94	1,524,542	3.39	4.7	117	2,045,600	3.99	4.7
13. Southeastern	56	1,988,928	8.38	3.7	391	17,562,309	3.01	3.9	447	19,551,237	3.22	3.9
14. Arkansas-Oklahoma	26	731,027	8.20	3.8	67	1,530,104	2.71	2.9	93	2,261,131	3.45	3.2
15. Southwestern	81	8,096,966	13.74	2.3	107	1,696,037	2.84	3.2	188	9,793,003	8.25	2.5
16. Northern Colorado	2	10,896	6.65	35.3	29	2,339,708	5.58	7.7	31	2,350,604	5.58	7.8
17. Southern Colorado	3	41,915	7.78	9.0	136	6,323,927	4.28	6.7	139	6,365,842	4.29	6.7
18. New Mexico	1	1,480	2.24	5.5	22	390,625	2.92	5.1	23	392,105	2.92	5.1
19. Wyoming	6	854,624	15.48	23.1	42	8,992,951	6.50	11.8	48	9,847,575	6.84	12.8
20. Utah	—	—	—	—	52	6,679,063	6.18	11.8	52	6,679,063	6.18	11.8
21. North-South Dakota (lignite) ..	32	1,881,086	18.66	10.2	25	665,678	8.96	13.6	57	2,546,764	14.54	11.1
22. Montana	2	2,556,341	78.92	25.0	31	1,910,447	7.04	5.8	33	4,466,788	14.70	16.8
23. Washington and Alaska	6	151,811	7.35	8.8	46	1,519,577	3.28	6.7	52	1,671,388	3.45	6.9
Total	1,370	109,986,865	15.46	5.3	5,663	467,630,462	5.04	5.4	7,033	577,617,327	5.78	5.4

TABLE 4. - NUMBER AND PRODUCTION OF BITUMINOUS-COAL AND LIGNITE UNDERGROUND MINES IN THE UNITED STATES, CLASSIFIED BY THICKNESS OF SEAMS MINED IN EACH STATE, IN 1945

(Exclusive of mines producing less than 1,000 tons)

State	Less than 2 feet			2 to 3 feet			3 to 4 feet			4 to 5 feet			5 to 6 feet			6 to 7 feet			7 to 8 feet			8 feet and over			Total	
	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)
Alabama	3	97,947	0.6	173	4,281,371	26.2	92	4,907,237	30.0	42	5,303,725	32.5	6	560,974	3.4	5	673,283	4.1	—	—	—	3	521,183	3.2	324	16,345,720
Alaska	—	—	—	—	—	—	—	—	—	1	(1)	—	3	131,668	44.2	—	—	—	—	—	—	1	(1)	—	5	297,644
Arizona	—	—	—	—	—	—	—	—	—	—	—	—	1	3,853	100.0	—	—	—	—	—	—	—	—	—	1	3,853
Arkansas	11	331,450	28.0	13	414,184	35.0	15	378,098	32.0	2	(1)	—	—	—	—	3	(1)	—	—	—	—	—	—	—	44	1,182,102
Colorado	2	6,101	.1	2	11,949	.2	14	350,845	4.6	28	1,773,059	23.4	41	1,342,782	17.7	22	811,806	10.7	12	762,679	10.1	40	2,508,980	33.2	161	7,568,201
Georgia	1	29,347	90.7	1	3,000	9.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	32,347
Illinois	—	—	—	—	—	—	15	361,708	.6	83	4,324,443	7.7	68	6,735,772	12.0	56	12,102,554	21.6	29	18,016,338	32.1	19	14,561,277	26.0	270	56,102,092
Indiana	—	—	—	—	—	—	8	98,151	.8	35	2,472,181	21.1	20	4,717,088	40.3	10	4,431,102	37.8	—	—	—	—	—	—	73	11,718,522
Iowa	1	5,046	.3	25	266,733	17.5	17	160,491	10.5	24	486,092	31.9	17	319,711	21.0	7	179,895	11.8	3	106,574	7.0	—	—	—	94	1,524,542
Kansas	6	74,170	27.2	11	81,925	30.0	5	116,964	42.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	22	273,059
Kentucky	2	40,902	.1	148	3,062,294	4.9	536	24,761,190	39.4	501	24,997,144	39.7	156	6,002,723	9.5	42	3,502,994	5.6	6	515,100	.8	2	15,750	(2)	1,393	62,898,097
Maryland	3	5,567	.4	27	294,937	19.1	19	780,976	50.5	5	15,154	1.0	6	76,930	5.0	2	21,663	1.4	4	105,060	6.8	18	244,890	15.8	84	1,545,177
Michigan	—	—	—	2	32,676	26.0	1	93,028	74.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	125,704
Missouri	15	79,054	16.1	11	135,084	27.6	14	217,426	44.3	9	57,339	11.7	1	1,519	.3	—	—	—	—	—	—	—	—	—	50	490,422
Montana (bit. and lig.) ..	1	1,443	.1	—	—	—	2	9,009	.5	5	546,296	28.6	3	641,967	33.6	13	666,361	34.9	2	(1)	—	5	(1)	—	31	1,910,447
New Mexico	—	—	—	—	—	—	3	41,331	2.8	10	219,977	14.8	8	1,211,307	81.7	2	5,240	.4	1	(1)	—	1	(1)	—	25	1,482,206
North Dakota (lignite) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	3,927	.6	3	10,003	1.5	18	648,715	97.9	23	662,645
Ohio	1	2,441	(2)	18	370,097	1.9	151	3,244,218	16.9	124	11,281,295	58.6	46	4,043,567	21.0	16	277,448	1.4	5	31,800	.2	2	2,780	(2)	363	19,253,646
Oklahoma	3	(1)	—	7	46,605	3.6	23	923,465	72.1	19	190,898	14.9	5	35,781	2.8	1	(1)	—	—	—	—	—	—	—	58	1,280,558
Oregon	—	—	—	—	—	—	—	—	—	1	16,500	100.0	—	—	—	—	—	—	—	—	—	—	—	—	1	16,500
Pennsylvania	8	814,983	.8	144	2,585,459	2.5	546	30,391,740	28.8	241	13,673,293	13.0	195	18,276,407	17.4	154	24,347,713	23.1	51	7,780,852	7.4	20	7,387,226	7.0	1,359	105,257,673
South Dakota (lignite) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	3,033	100.0	—	—	—	2	3,033
Tennessee	1	(1)	—	17	984,507	16.2	90	3,567,520	58.8	18	925,790	15.3	4	319,306	5.3	2	(1)	—	—	—	—	—	—	—	132	6,064,245
Utah	—	—	—	—	—	—	5	191,954	2.9	5	128,890	1.9	4	340,141	5.1	5	677,351	10.2	7	463,776	6.9	26	4,876,951	73.0	52	6,679,063
Virginia	1	(1)	—	15	760,836	4.5	57	7,476,648	44.2	27	3,601,524	21.3	27	3,276,983	19.4	5	294,298	1.7	1	(1)	—	4	1,411,438	8.3	137	16,926,103
Washington	—	—	—	3	105,385	8.7	5	27,226	2.3	12	562,405	46.7	2	43,854	3.6	6	210,103	17.4	4	118,089	9.8	8	138,371	11.5	40	1,205,433
West Virginia	—	—	—	63	7,197,159	5.2	275	39,322,610	28.5	229	30,567,507	22.2	109	17,696,104	12.9	89	22,645,334	16.4	61	13,699,306	10.0	46	6,660,457	4.8	872	137,788,477
Wyoming	—	—	—	—	—	—	4	124,847	1.4	6	261,570	2.9	3	374,133	4.2	5	524,202	5.8	6	2,767,159	30.8	18	4,941,040	54.9	42	8,992,951
Undistributed	—	96,350	—	—	—	—	—	—	—	—	97,537	—	—	—	—	—	280,760	—	—	107,861	—	—	146,867	—	—	—
Total	59	1,584,801	.4	680	20,634,201	4.4	1,897	117,546,682	25.1	1,427	101,502,619	21.7	725	66,152,570	14.2	447	71,656,034	15.3	197	44,487,630	9.5	231	44,065,925	9.4	5,663	467,630,462

1/ Included in "Undistributed".
2/ Less than 0.05 percent.

TABLE 5. - NUMBER AND PRODUCTION OF BITUMINOUS-COAL AND LIGNITE STRIP MINES IN THE UNITED STATES, CLASSIFIED BY THICKNESS OF SEAMS MINED IN EACH STATE IN 1945

(Exclusive of mines producing less than 1,000 tons)

State	Less than 2 feet			2 to 3 feet			3 to 4 feet			4 to 5 feet			5 to 6 feet			6 to 7 feet			7 to 8 feet			8 feet and over			Total	
	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)
Alabama	1	2,707	0.2	27	869,910	46.0	15	542,824	28.7	5	242,807	12.8	3	123,711	6.5	—	—	—	—	—	—	2	108,860	5.8	53	1,890,819
Arkansas	5	156,146	23.2	8	141,945	21.1	2	42,268	6.3	3	136,539	20.3	1	26,578	4.0	3	149,901	22.3	1	18,447	2.8	—	—	—	23	671,824
Colorado	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	14,028	26.6	—	—	—	4	38,783	73.4	5	52,811
Georgia	1	10,221	100.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	10,221
Illinois	2	115,745	.7	3	564,387	3.3	7	4,120,891	24.4	13	5,564,113	32.9	5	2,048,117	12.1	10	3,905,008	23.1	1	515,287	3.1	2	75,552	.4	43	16,909,100
Indiana	1	(1)	—	11	862,865	6.4	16	1,823,154	13.5	22	9,523,097	70.7	7	953,831	7.1	3	183,720	1.4	1	(1)	—	—	—	—	61	13,464,089
Iowa	—	—	—	—	—	—	5	41,289	7.9	12	320,159	61.4	2	60,213	11.6	4	99,397	19.1	—	—	—	—	—	—	23	521,058
Kansas	22	2,621,167	88.7	1	(1)	—	5	50,275	1.7	1	(1)	—	—	—	—	—	—	—	—	—	—	—	—	—	29	2,955,500
Kentucky	1	82,000	1.2	7	231,774	3.5	14	983,948	14.7	7	578,527	8.6	8	1,366,125	20.4	9	2,049,371	30.6	1	(1)	—	1	(1)	—	48	6,694,839
Maryland	—	—	—	1	(1)	—	1	(1)	—	—	—	—	—	—	—	—	—	—	—	—	—	8	209,994	96.5	10	217,526
Missouri	11	593,028	17.0	16	1,796,849	51.4	9	1,102,425	31.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	36	3,492,302
Montana (bit. and lig.) .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1,133	(2)	—	—	—	1	2,555,208	100.0	2	2,556,341
New Mexico	—	—	—	—	—	—	—	—	—	—	—	—	1	1,480	100.0	—	—	—	—	—	—	—	—	—	1	1,480
North Dakota (lignite) ..	—	—	—	—	—	—	1	(1)	—	2	13,880	.7	1	(1)	—	6	26,037	1.4	4	221,727	11.9	16	1,595,253	85.8	30	1,859,674
Ohio	1	(1)	—	38	1,943,839	14.4	58	2,847,736	21.1	64	8,116,547	60.2	6	401,474	3.0	3	154,062	1.1	1	(1)	—	1	(1)	—	172	13,483,789
Oklahoma	8	978,160	60.1	4	295,009	18.1	3	156,072	9.6	3	199,177	12.2	—	—	—	—	—	—	—	—	—	—	—	—	18	1,628,418
Pennsylvania	13	668,372	2.4	129	4,734,493	17.1	183	8,003,746	28.9	116	8,421,897	30.4	58	2,540,144	9.1	53	1,991,877	7.2	27	741,188	2.7	19	605,953	2.2	598	27,707,670
South Dakota (lignite) ..	—	—	—	—	—	—	—	—	—	1	(1)	—	1	(1)	—	—	—	—	—	—	—	—	—	—	2	21,412
Tennessee	1	41,162	19.9	2	64,733	31.4	5	100,568	48.7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	206,463
Texas (lignite)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	79,949	100.0	1	79,949
Virginia	—	—	—	2	162,468	52.6	2	(1)	—	1	(1)	—	—	—	—	1	13,969	4.5	—	—	—	2	82,209	26.6	8	308,890
Washington	—	—	—	1	44,301	29.2	—	—	—	1	44,112	29.0	—	—	—	—	—	—	—	—	—	4	63,398	41.8	6	151,811
West Virginia	—	—	—	6	378,719	2.7	27	1,378,826	9.7	32	1,623,714	11.4	20	1,451,529	10.2	45	3,234,052	22.7	27	3,880,585	27.2	29	2,298,830	16.1	186	14,246,255
Wyoming	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	259,950	30.4	—	—	—	5	594,674	69.6	6	854,624
Undistributed	—	14,960	—	—	258,857	—	—	40,554	—	—	60,825	—	—	5,787	—	—	—	—	—	1,347,180	—	—	178,507	—	—	—
Total	67	5,283,668	4.8	256	12,350,149	11.2	353	21,234,576	19.3	283	34,845,394	31.7	113	8,978,989	8.2	140	12,082,505	11.0	63	6,724,414	6.1	95	8,487,170	7.7	1,370	109,986,865

1/ Included in "Undistributed".
2/ Less than 0.05 percent.

TABLE 6. - NUMBER AND PRODUCTION OF ALL BITUMINOUS-COAL AND LIGNITE MINES IN THE UNITED STATES, CLASSIFIED BY THICKNESS OF SEAMS MINED IN EACH STATE, IN 1945

(Exclusive of mines producing less than 1,000 tons)

State	Less than 2 feet			2 to 3 feet			3 to 4 feet			4 to 5 feet			5 to 6 feet			6 to 7 feet			7 to 8 feet			8 feet and over			Total	
	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)
Alabama	4	100,654	0.6	200	5,151,281	28.2	107	5,450,061	29.9	47	5,546,532	30.4	9	684,685	3.8	5	673,283	3.7	—	—	—	5	630,043	3.4	377	18,236,539
Alaska	—	—	—	—	—	—	—	—	—	1	(1)	—	3	131,668	44.2	—	—	—	—	—	—	1	(1)	—	5	297,644
Arizona	—	—	—	—	—	—	—	—	—	—	—	—	1	3,853	100.0	—	—	—	—	—	—	—	—	—	1	3,853
Arkansas	16	487,596	26.3	21	556,129	30.0	17	420,366	22.7	5	(1)	—	1	26,578	1.4	6	(1)	—	1	18,447	1.0	—	—	—	67	1,853,926
Colorado	2	6,101	.1	2	11,949	.2	14	350,845	4.6	28	1,773,059	23.3	41	1,342,782	17.6	23	825,834	10.8	12	762,679	10.0	44	2,547,763	33.4	166	7,621,012
Georgia	2	39,568	93.0	1	3,000	7.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	42,568
Illinois	2	115,745	.2	3	564,387	.8	22	4,482,599	6.1	96	9,888,556	13.5	73	8,783,889	12.0	66	16,007,562	21.9	30	18,531,625	25.4	21	14,636,829	20.1	313	73,011,192
Indiana	1	(1)	—	11	862,865	3.4	24	1,921,305	7.6	57	11,995,278	47.6	27	5,670,919	22.5	13	4,614,822	18.3	1	(1)	—	—	—	—	134	25,182,611
Iowa	1	5,046	.2	25	266,733	13.0	22	201,780	9.9	36	806,251	39.4	19	379,924	18.6	11	279,292	13.7	3	106,574	5.2	—	—	—	117	2,045,600
Kansas	28	2,695,337	83.5	12	(1)	—	10	167,239	5.2	1	(1)	—	—	—	—	—	—	—	—	—	—	—	—	—	51	3,228,559
Kentucky	3	122,902	.2	155	3,294,068	4.7	550	25,745,138	37.0	508	25,575,671	36.8	164	7,368,848	10.6	51	5,552,365	8.0	7	(1)	—	3	(1)	—	1,441	69,592,936
Maryland	3	5,567	.3	28	(1)	—	20	(1)	—	5	15,154	.9	6	76,930	4.4	2	21,663	1.2	4	105,060	6.0	26	454,884	25.8	94	1,762,703
Michigan	—	—	—	2	32,676	26.0	1	93,028	74.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	125,704
Missouri	26	672,082	16.9	27	1,931,933	48.5	23	1,319,851	33.1	9	57,339	1.4	1	1,519	.1	—	—	—	—	—	—	—	—	—	86	3,982,724
Montana (bit. and lig.)	1	1,443	(2)	—	—	—	2	9,009	.2	5	546,296	12.2	3	641,967	14.4	14	667,494	14.9	2	(1)	—	6	(1)	—	33	4,466,788
New Mexico	—	—	—	—	—	—	3	41,331	2.8	10	219,977	14.8	9	1,212,787	81.7	2	5,240	.4	1	(1)	—	1	(1)	—	26	1,483,686
North Dakota (lignite)	—	—	—	—	—	—	1	(1)	—	2	13,880	.6	1	(1)	—	8	29,964	1.2	7	231,730	9.2	34	2,243,968	89.0	53	2,522,319
Ohio	2	(1)	—	56	2,313,936	7.1	209	6,091,954	18.6	188	19,397,842	59.3	52	4,445,041	13.6	19	431,510	1.3	6	(1)	—	3	(1)	—	535	32,737,435
Oklahoma	11	(1)	—	11	341,614	11.7	26	1,079,537	37.1	22	390,075	13.4	5	35,781	1.2	1	(1)	—	—	—	—	—	—	—	76	2,908,976
Oregon	—	—	—	—	—	—	—	—	—	1	16,500	100.0	—	—	—	—	—	—	—	—	—	—	—	—	1	16,500
Pennsylvania	21	1,483,355	1.1	273	7,319,952	5.5	729	38,395,486	28.9	357	22,095,190	16.6	253	20,816,551	15.7	207	26,339,590	19.8	78	8,522,040	6.4	39	7,993,179	6.0	1,957	132,965,343
South Dakota (lignite)	—	—	—	—	—	—	—	—	—	1	(1)	—	1	(1)	—	—	—	—	2	3,033	12.4	—	—	—	4	24,445
Tennessee	2	(1)	—	19	1,049,240	16.7	95	3,668,088	58.5	18	925,790	14.8	4	319,306	5.1	2	(1)	—	—	—	—	—	—	—	140	6,270,708
Texas (lignite)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	79,949	100.0	1	79,949
Utah	—	—	—	—	—	—	5	191,954	2.9	5	128,390	1.9	4	340,141	5.1	5	677,351	10.1	7	463,776	7.0	26	4,876,951	73.0	52	6,679,063
Virginia	1	(1)	—	17	923,304	5.4	59	(1)	—	28	(1)	—	27	3,276,983	19.0	6	308,267	1.8	1	(1)	—	6	1,493,647	8.7	145	17,234,993
Washington	—	—	—	4	149,686	11.0	5	27,226	2.0	13	606,517	44.7	2	43,854	3.2	6	210,103	15.5	4	118,089	8.7	12	201,769	14.9	46	1,357,244
West Virginia	—	—	—	69	7,575,878	5.0	302	40,701,436	26.8	261	32,191,221	21.2	129	19,147,633	12.6	134	25,879,386	17.0	88	17,579,391	11.5	75	8,959,287	5.9	1,058	152,034,732
Wyoming	—	—	—	—	—	—	4	124,847	1.3	6	261,570	2.6	3	374,133	3.8	6	784,152	8.0	6	2,767,159	28.1	23	5,535,714	56.2	48	9,847,575
Undistributed	—	1,133,073	—	—	635,719	—	—	8,298,178	—	—	3,896,425	—	—	5,787	—	—	430,661	—	—	2,001,941	—	—	2,899,112	—	—	—
Total	126	6,868,469	1.2	936	32,984,350	5.7	2,250	138,781,258	24.0	1,710	136,348,013	23.6	838	75,131,559	13.0	587	83,738,539	14.5	260	51,212,044	8.9	326	52,553,095	9.1	7,033	577,617,327

1/ Included in "Undistributed".
2/ Less than 0.05 percent.

TABLE 7. - NUMBER AND PRODUCTION OF BITUMINOUS-COAL AND LIGNITE UNDERGROUND MINES IN THE UNITED STATES, CLASSIFIED BY THICKNESS OF SEAMS MINED IN EACH DISTRICT IN 1945

(Districts as defined in the Bituminous Coal Act of 1937 and modifications thereto. Exclusive of mines producing less than 1,000 tons)

District	Less than 2 feet			2 to 3 feet			3 to 4 feet			4 to 5 feet			5 to 6 feet			6 to 7 feet			7 to 8 feet			8 feet and over			Total	
	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)	Percent of total production	Number of mines	Production (net tons)
1. Eastern Pennsylvania	6	462,682	1.0	162	2,743,961	6.4	482	27,998,675	64.9	197	8,602,916	20.0	64	2,800,268	6.5	13	122,812	0.3	7	123,515	0.3	19	261,458	0.6	950	43,116,287
2. Western Pennsylvania	5	357,868	.5	17	294,247	.4	86	3,360,565	5.2	56	5,341,594	8.3	138	15,619,856	24.3	143	24,246,564	37.7	48	7,762,397	12.1	20	7,387,226	11.5	513	64,370,317
3. Northern West Virginia	—	—	—	4	213,793	.6	34	3,217,829	9.4	59	2,425,161	7.1	40	3,410,330	10.0	55	9,660,558	28.3	52	10,423,437	30.5	37	4,804,203	14.1	281	34,155,311
4. Ohio	1	2,441	(1)	18	370,097	1.9	151	3,244,218	16.9	124	11,281,295	58.6	46	4,043,567	21.0	16	277,448	1.4	5	31,800	.2	2	2,780	(1)	363	19,253,646
5. Michigan	—	—	—	2	32,676	26.0	1	93,028	74.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	125,704
6. Panhandle	—	—	—	—	—	—	2	12,764	.3	17	2,761,027	75.5	6	885,430	24.2	—	—	—	—	—	—	—	—	—	25	3,659,221
7. Southern Numbered 1	—	—	—	37	5,364,584	9.9	123	21,643,472	39.9	49	8,585,376	15.8	27	8,206,915	15.1	13	5,918,773	10.9	5	2,080,213	3.8	7	2,500,730	4.6	261	54,300,063
8. Southern Numbered 2	4	56,634	(1)	187	6,257,198	5.4	714	48,392,586	42.1	450	38,907,075	33.8	134	10,644,467	9.2	42	8,248,560	7.2	9	1,785,006	1.6	7	766,144	.7	1,547	115,057,670
9. West Kentucky	—	—	—	—	—	—	33	548,204	3.7	186	7,128,119	48.7	86	4,064,087	27.8	28	2,873,973	19.6	2	22,278	.2	—	—	—	335	14,636,661
10. Illinois	—	—	—	—	—	—	15	361,708	.6	83	4,324,443	7.7	68	6,735,772	12.0	56	12,102,554	21.6	29	18,016,338	32.1	19	14,561,277	26.0	270	56,102,092
11. Indiana	—	—	—	—	—	—	8	98,151	.8	35	2,472,181	21.1	20	4,717,088	40.3	10	4,431,102	37.8	—	—	—	—	—	—	73	11,718,522
12. Iowa	1	5,046	.3	25	266,733	17.5	17	160,491	10.5	24	486,092	31.9	17	319,711	21.0	7	179,895	11.8	3	106,574	7.0	—	—	—	94	1,524,542
13. Southeastern	4	127,294	.7	181	4,295,780	24.5	141	6,033,826	34.3	49	5,332,869	30.4	8	578,074	3.3	5	673,283	3.8	—	—	—	3	521,183	3.0	391	17,562,309
14. Arkansas-Oklahoma	14	412,068	26.9	16	428,588	28.0	21	452,733	29.6	8	184,725	12.1	4	30,468	2.0	4	21,522	1.4	—	—	—	—	—	—	67	1,530,104
15. Southwestern	21	153,224	9.0	26	249,210	14.7	36	1,183,220	69.8	22	103,551	6.1	2	6,832	.4	—	—	—	—	—	—	—	—	—	107	1,696,037
16. Northern Colorado	—	—	—	—	—	—	1	143,663	6.1	2	183,685	7.9	12	397,636	17.0	—	—	—	6	581,068	24.8	8	1,033,656	44.2	29	2,339,708
17. Southern Colorado	2	6,101	.1	2	11,949	.2	13	207,182	3.3	27	1,719,962	27.2	32	1,909,992	30.2	22	811,806	12.8	6	181,611	2.9	32	1,475,324	23.3	136	6,323,927
18. New Mexico	—	—	—	—	—	—	3	41,331	10.6	9	89,389	22.9	6	250,314	64.1	2	5,240	1.3	1	(2)	—	1	(2)	—	22	390,625
19. Wyoming	—	—	—	—	—	—	4	124,847	1.4	6	261,570	2.9	3	374,133	4.2	5	524,202	5.8	6	2,767,159	30.8	18	4,941,040	54.9	42	8,992,951
20. Utah	—	—	—	—	—	—	5	191,954	2.9	5	128,890	1.9	4	340,141	5.1	5	677,351	10.1	7	463,776	7.0	26	4,876,951	73.0	52	6,679,063
21. North-South Dakota (lignite) ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	3,927	.6	5	13,036	2.0	18	648,715	97.4	25	665,678
22. Montana	1	1,443	.1	—	—	—	2	9,009	.5	5	546,296	28.6	3	641,967	33.6	13	666,361	34.9	2	(2)	—	5	(2)	—	31	1,910,447
23. Washington and Alaska	—	—	—	3	105,385	6.9	5	27,226	1.8	14	636,403	41.9	5	175,522	11.6	6	210,103	13.8	4	118,089	7.8	9	246,849	16.2	46	1,519,577
Undistributed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11,333	—	—	38,389	—	—	—
Total	59	1,584,801	.4	680	20,634,201	4.4	1,897	117,546,682	25.1	1,427	101,502,619	21.7	725	66,152,570	14.2	447	71,656,034	15.3	197	44,487,630	9.5	231	44,065,925	9.4	5,663	467,630,462

1/ Less than 0.05 percent.
2/ Included in "Undistributed".

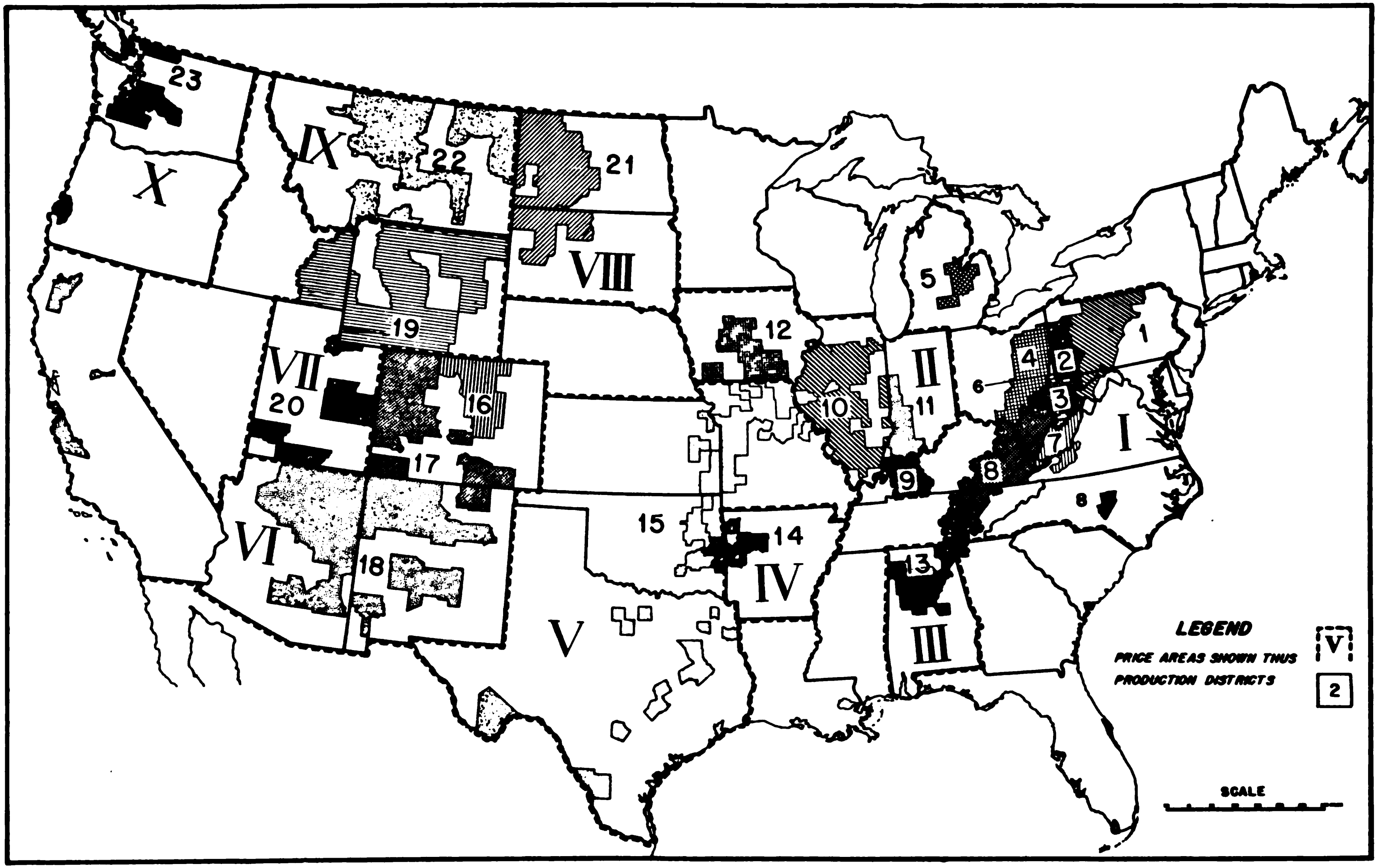

Figure 4. - Minimum price areas and production districts as set forth in the Bituminous Coal Act of 1937.

Table 2 contains 1945 data on productivity and average thickness of seams mined at strip and underground mines, by States. The correlation between thickness of seam and productivity was not universal; instead, in a number of States and districts, great productivity was achieved in thin seams. Conversely, several States and districts had low productivity in thick seams. The average thickness of seams mined at strip mines in the 24 States ranged from 1.5 feet in Georgia to 25 feet in Montana. Underground bituminous-coal and lignite mines were operated in 27 States and Alaska in 1945, and the average thickness of seams mined ranged from 1.6 feet in Georgia to 13.7 feet in North Dakota. Table 3 contains data by Coal Act Districts similar to those given by States in table 2.

Table 4 shows number of mines and production data of underground bituminous-coal and lignite mines classified by thickness of seams mined in each State in 1945. Similar data for strip mines and total all mines are included in tables 5 and 6, respectively.

Table 7 shows number of mines and production data of underground bituminous-coal and lignite mines classified by thickness of seams mined in each Bituminous Coal Act District in 1945. Similar data for strip mines and total all mines are included in tables 8 and 9, respectively.

Table 10 gives number of mines and production data of bituminous-coal and lignite mines classified by size of output and thickness of seams mined in 1920 and 1945.

DESCRIPTION OF DISTRICTS

(As defined in the Bituminous Coal Act of 1937)

District 1. Eastern Pennsylvania

The following counties in Pennsylvania: Bedford, Blair, Bradford, Cambria, Cameron, Centre, Clarion, Clearfield, Clinton, Elk, Forest, Fulton, Huntingdon, Jefferson, Lycoming, McKean, Mifflin, Potter, Somerset, Tioga.

Armstrong County, including mines served by the P. & S. R.R. on the west bank of the Allegheny River, and north of the Conemaugh division of the Pennsylvania Railroad.

Fayette County, all mines on and east of the line of Indian Creek Valley branch of the Baltimore & Ohio Railroad.

Indiana County, north of but excluding the Saltsburg branch of the Pennsylvania Railroad between Edri and Blairsville, both exclusive.

Westmoreland County, including all mines served by the Pennsylvania Railroad, Torrance, and east.

All coal-producing counties in the State of Maryland.

The following counties in West Virginia: Grant, Mineral, and Tucker.

District 2. Western Pennsylvania

The following counties in Pennsylvania: Allegheny, Beaver, Butler, Greene, Lawrence, Mercer, Venango, Washington.

Armstrong County, west of the Allegheny River and exclusive of mines served by the P. & S. R.R.

Indiana County, including all mines served on the Saltsburg branch of the Pennsylvania Railroad north of Conemaugh River.

Fayette County, except all mines on and east of the line of Indian Creek Valley branch of the Baltimore & Ohio Railroad.

Westmoreland County, including all mines except those served by the Pennsylvania Railroad from Torrance, east.

District 3. Northern West Virginia

The following counties in West Virginia: Barbour, Braxton, Calhoun, Doddridge, Gilmer, Harrison, Jackson, Lewis, Marion, Monongalia, Pleasants, Preston, Randolph, Ritchie, Roane, Taylor, Tyler, Upshur, Webster, Wetzel, Wirt, Wood.

That part of Nicholas County including mines served by the Baltimore & Ohio Railroad and north.

District 4. Ohio

All coal-producing counties in Ohio.

District 5. Michigan

All coal-producing counties in Michigan.

District 6. Panhandle

The following counties in West Virginia: Brooke, Hancock, Marshall, and Ohio.

District 7. Southern No. 1

The following counties in West Virginia: Greenbrier, Mercer, Monroe, Pocahontas, Summers.

Fayette County, east of Gauley River and including the Gauley River branch of the Chesapeake & Ohio Railroad and mines served by the Virginian Railway.

McDowell County, that portion served by the Dry Fork branch of the Norfolk & Western Railroad and east thereof.

Raleigh County, excluding all mines on the Coal River branch of the Chesepeake & Ohio Railroad.

Wyoming County, that portion served by the Gilbert branch of the Virginian Railway lying east of the mouth of Skin Fork of Guyandot River and that portion served by the main line and the Glen Rogers branch of the Virginian Railway.

The following counties in Virginia: Montgomery, Pulaski, Wythe, Giles, Craig.

Tazewell County, that portion served by the Dry Fork branch to Cedar Bluff and from Bluestone Junction to Boissevain branch of the Norfolk & Western Railroad and Richlands-Jewell Ridge branch of the Norfolk & Western Railroad.

Buchanan County, that portion served by the Richlands-Jewell Ridge branch of the Norfolk & Western Railroad and that portion of said county on the headwaters of Dismal Creek, east of Lynn Camp Creek (a tributary of Dismal Creek).

District 8. Southern No. 2

The following counties in West Virginia: Boone, Clay, Kanawha, Lincoln, Logan, Mason, Mingo, Putnam, Wayne, Cabell.

Fayette County, west of but not including mines of the Gauley River branch of the Chesapeake & Ohio Railroad.

McDowell County, that portion not served by and lying west of the Dry Fork branch of the Norfolk & Western Railroad.

Raleigh County, all mines on the Coal River branch of the Chesapeake & Ohio Railroad and north thereof.

Nicholas County, that part south of and not served by the Baltimore & Ohio Railroad.

Wyoming County, that portion served by Gilbert branch of the Virginian Railway lying west of the mouth of Skin Fork of Guyandot River.

The following counties in Virginia: Dickinson, Lee, Russell, Scott, Wise.

All of Buchanan County, except that portion of the headwaters of Dismal Creek east of Lynn Camp Creek (a tributary of Dismal Creek) and that portion served by the Richlands-Jewell Ridge branch of the Norfolk & Western Railroad.

Tazewell County, except portions served by the Dry Fork branch of Norfolk & Western Railroad and branch from Bluestone Junction to Boissevain of Norfolk & Western Railroad and Richlands-Jewell Ridge branch of the Norfolk & Western Railroad.

The following counties in Kentucky: Bell, Boyd, Breathitt, Carter, Clay, Elliott, Floyd, Greenup, Harlan, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, McCreary, Magoffin, Martin, Morgan, Owsley, Perry, Pike, Rockcastle, Wayne, Whitley.

The following counties in Tennessee: Anderson, Campbell, Claiborne, Cumberland, Fentress, Morgan, Overton, Roane, Scott.

The following counties in North Carolina: Lee, Chatham, Moore.

District 9. West Kentucky

The following counties in Kentucky: Butler, Christian, Crittenden, Daviess, Hancock, Henderson, Hopkins, Logan, McLean, Muhlenberg, Ohio, Simpson, Todd, Union, Warren, Webster.

District 10. Illinois

All coal-producing counties in Illinois.

District 11. Indiana

All coal-producing counties in Indiana.

District 12. Iowa

All coal-producing counties in Iowa.

District 13. Southeastern

All coal-producing counties in Alabama.

The following counties in Georgia: Dade, Walker.

The following counties in Tennessee: Marion, Grundy, Hamilton, Bledsoe, Sequatchie, White, Van Buren, Warren, McMinn, Rhea.

District 14. Arkansas-Oklahoma

The following counties in Arkansas: All counties in the State.

The following counties in Oklahoma: Haskell, LeFlore, Sequoyah.

District 15. Southwestern

All coal-producing counties in Kansas. All coal-producing counties in Texas. All coal-producing counties in Missouri.

The following counties in Oklahoma: Coal, Craig, Latimer, Muskogee, Okmulgee, Pittsburg, Rogers, Tulsa, Wagoner.

District 16. Northern Colorado

The following counties in Colorado: Adams, Arapahoe, Boulder, Douglas, Elbert, El Paso, Jackson, Jefferson, Larimer, Weld.

District 17. Southern Colorado

The following counties in Colorado: All counties not included in northern Colorado district.

The following counties in New Mexico: All coal-producing counties in the State of New Mexico, except those included in the New Mexico district.

District 18. New Mexico

The following counties in New Mexico: Grant, Lincoln, McKinley, Rio Arriba, Sandoval, San Juan, San Miguel, Santa Fe, Socorro.

The following counties in Arizona: Pinal, Navajo, Graham, Apache, Coconino.

All coal-producing counties in California.

District 19. Wyoming

All coal-producing counties in Wyoming.

The following counties in Idaho: Fremont, Jefferson, Madison, Teton, Bonneville, Bingham, Bannock, Power, Caribou, Oneida, Franklin, Bear Lake.

District 20. Utah

All coal-producing counties in Utah.

District 21. North Dakota-South Dakota

All coal-producing counties in North Dakota. All coal-producing counties in South Dakota.

District 22. Montana

All coal-producing counties in Montana.

District 23. Washington

All coal-producing counties in Washington. All coal-producing counties in Oregon.

The Territory of Alaska.